

CLAIMS

I claim:

[c1] 1. An image sensor comprising:
a plurality of pixels formed in a semiconductor substrate, each pixel including a light
sensitive element;
a micro-lens over each of said light sensitive elements; and
a raised ridge structure surrounding each of said micro-lenses.

[c2] 2. The image sensor of Claim 1 wherein said raised ridge structure is circular.

[c3] 3. The image sensor of Claim 1 wherein said raised ridge structure has a
triangular cross-section.

[c4] 4. The image sensor of Claim 1 wherein the micro-lenses are formed from
polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).

[c5] 5. The image sensor of Claim 1 wherein said raised ridge structure has a height
on the order of 0.2 microns.

[c6] 6. The image sensor of Claim 1 wherein said raised ridge structure is formed
from the same material that underlies said micro-lenses.

[c7] 7. The image sensor of Claim 1 further including a color filter layer between said micro-lenses and said light sensitive elements.

[c8] 8. A pixel of an image sensor comprising:
a light sensitive element formed in a semiconductor substrate;
a micro-lens over said light sensitive element; and
a raised ridge structure surrounding said micro-lens.

[c9] 9. The pixel of Claim 8 wherein said raised ridge structure is circular.

[c10] 10. The pixel of Claim 8 wherein said raised ridge structure has a triangular cross-section.

[c11] 11. The pixel of Claim 8 wherein the micro-lens is formed from polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).

[c12] 12. The pixel of Claim 8 wherein said raised ridge structure has a height on the order of 0.2 microns.

[c13] 13. The pixel of Claim 8 wherein said raised ridge structure is formed from the same material that underlies said micro-lenses.

[c14] 14. The pixel of Claim 8 further including a color filter layer between said micro-lens and said light sensitive element.

[c15] 15. A method of forming a pixel of an image sensor comprising:
forming a light sensitive element in a semiconductor substrate;
forming a top planarizing layer over said light sensitive element;
forming a raised ridge structure over said top planarizing layer, said raised ridge
structure encompassing said light sensitive element; and
forming a microlens within the interior of said raised ridge structure and over said
light sensitive element.

[c16] 16. The method of Claim 15 wherein said raised ridge structure is formed in said
top planarizing layer.

[c17] 17. The method of Claim 15 wherein said raised ridge structure has a triangular
cross section.

[c18] 18. The method of Claim 15 wherein said raised ridge structure is a closed
shape.

[c19] 19. The method of Claim 15 further including forming a color filter layer
between said micro-lens and said light sensitive element.